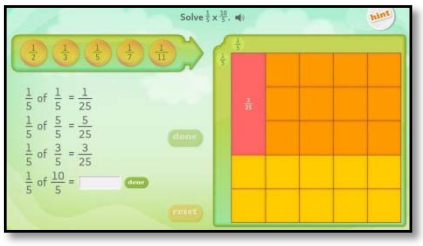


Fraction Multiplication 2

The interactive white board tool for this lesson can be found on our website under Resources and Teacher Tools. (www.dreambox.com/teachertools)

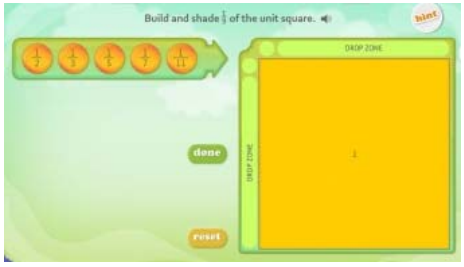
This DreamBox lesson uses an area model to develop conceptual understanding of how to multiply two fractions and represent fraction products as rectangular areas. Students learn to build rectangles to represent and visualize the product of two fractions.

Sample Lesson

Objective: Students compose rectangles to solve fraction multiplication problems with understanding.

Background: The area model is a model for multiplying fractions of a whole that develops conceptual understanding. Specifically, students learn to recognize how the products of numerators and denominators are represented by the shaded portions of the whole. To complete this lesson, students will use multiplication facts, a basic understanding of equivalent fractions and their prior knowledge of arrays and area models to represent multiplication.

Instruction:



1. Bring up the DreamBox interactive white board lesson.

2. The teacher begins, “This square represents 1 whole unit. It has an area of 1 square unit. The side lengths are all 1 unit. We are asked to build and shade 1/9 of the square. What do we have to do first?”
   Possible responses:
   - “We need to divide the square into ninths.”
   - “We need to figure out how to divide the square into nine pieces.”
   - “We need to build the square to show nine equal parts.”

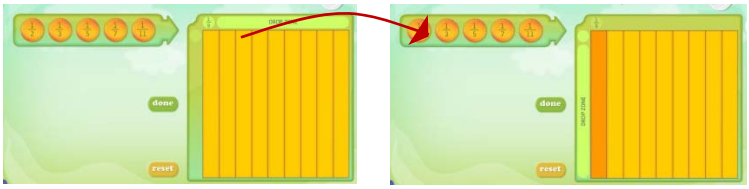
3. The teacher asks, “If we have to divide this square into nine equal parts, how do we do this when we can only divide using the fractions that are listed here? I don’t see ninths. Discuss your strategy with your partner.” After students have discussed possible

Adapted from: Fosnot & Dolk. Young Mathmeticians at Work: Constructing Fractions, Decimals, and Percents (Portsmouth, NH: Heinemann), 117-122.

strategies, the teacher asks them to share and drag the fraction to the DROP ZONE and click on the fraction that models 1/9.

Possible responses:

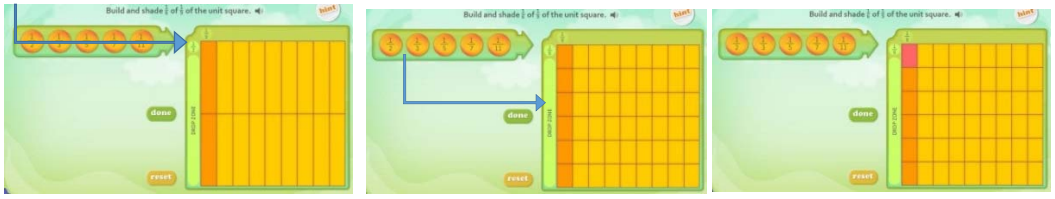
- "We can start by dividing the square into thirds because nine is divisible by three."
- "We can divide the square into thirds twice because three times three is nine."
- "We can divide it into three pieces and then divide each third into three pieces."



4. The teachers then states, "Now that we have divided the whole into ninths and shaded 1/9, how can we build and shade 1/6 of that 1/9? Again, I don't see sixths as an option. Where do we start? Discuss your strategy with your partner." After students have shared, ask a volunteer to come to the board and model his or her strategy.

   Possible responses:

   - "We can divide the whole into thirds again and then each third in ½ because 3 x 2 = 6."
   - "We can divide the whole into halves and then each half into thirds because 2 x 3= 6.""
   - If an incorrect choice is made, allow the student to try and see what happens, then guide the student to accurately building the rectangle.



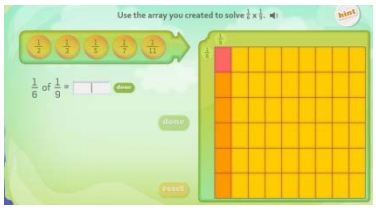
5. After the students have divided the unit square into parts and shaded 1/6 of 1/9, the manipulative asks students to find the product of 1/6 x 1/9. See picture (a). The teacher then asks, "We have created a rectangle that represents the answer to this problem. Discuss what you think the answer is and how you know." The teacher then asks a student to share his or her answer and type it into the window.

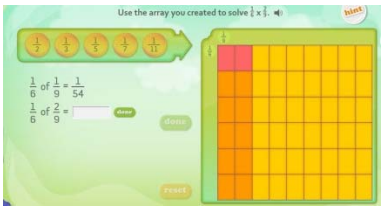
   Possible responses:

   - "The answer is 1/54 because we've shaded 1 of 54 sections of the unit square."
   - "The answer is 1/54 because we shaded 1/6 of the 1/9 rectangle. This only ends up being 1 of the total 54 sections we created."
   - "1/6 because we only shaded one part of the orange." If this is the response, question the student about what represents the whole and what the orange sections represent. Then ask him to tell you how many parts the whole has been divided into.

Adapted from: Fosnot & Dolk. Young Mathmeticians at Work: Constructing Fractions, Decimals, and Percents (Portsmouth, NH: Heinemann), 117-122.

- "1/54 because I multiplied the numerators and denominators." If this is the response, question the student about the shaded rectangles and how it models his response.





6. The manipulative then generates more related problems using the same unit square and asks the students to use the array to solve. Continue asking students to discuss their answers and share responses in a guided discussion as described above. See picture (b).

7. The final problem is generated without the prompt to use the array to solve the problem. See picture (c). Ask the students to look at the other problems and find the pattern. Ask them to share with their partner what they notice. After discussing, ask a volunteer to describe the relationship of this new problem to their previous work.

   Possible responses:
   - "You multiply the numerator and denominator."
   - "The denominator is the same for all the problems which is the answer to 6x9."
   - "The numerator is the number of squares that is shaded and the denominator is the number of sections the unit is divided into."

8. Once students have discussed generalizations of the relationship, ask a student to use the pattern to solve the final problem, type the answer in the window and describe how that would be represented on the square unit. See picture (c).

9. Continue by generating another unit square and set of problems as described in steps 1-8.

Adapted from: Fosnot & Dolk. Young Mathmeticians at Work: Constructing Fractions, Decimals, and Percents (Portsmouth, NH: Heinemann), 117-122.